CLAIMS

I claim:

1. A used PVD component refurbishing method comprising:

providing a used PVD component having a layer deposited on a component surface;

first etching the deposited layer using a first acid-comprising etchant;

after the first etching, entraining abrasive particles in a flow of gas, impinging the particles on the etched layer, and abrading the etched layer; and

after the abrading, second etching the abraded layer using a second acid-comprising etchant.

2. The method of claim 1 wherein the first etching, the abrading, and the second etching remove the deposited layer at a rate greater than the same first etching and the same second etching performed without the abrading.

3. The method of claim 1 wherein the first etching, the abrading, and the second etching remove less of the PVD component surface than occurs in removing an equivalent thickness of the deposited layer by extending the abrading and performing the same second etching without the first etching.

4. The method of claim 1 wherein the component comprises a coil.

5. The method of claim 4 wherein the coil was used as a RF coil in a DC magnetron vacuum PVD reactor performing plasma sputtering.

6. The method of claim 4 wherein the coil is a tantalum coil and the deposited layer comprises TaN deposited on the coil surface during the PVD use.

7. The method of claim 4 wherein the coil comprises mounting bosses with interior surfaces and the method further comprises protecting the interior surfaces during the first etching and the abrading, but not during the second etching.

8. The method of claim 1 wherein the component is a metal component.

9. The method of claim 1 wherein the first and second etchants comprise aqueous HF.

10. The method of claim 1 wherein the first and second etchants are the same etchant that, aside from processing impurities, consists of a mixture of equal volumetric parts deionized water, HF, and HNO_3.

11. The method of claim 1 wherein the first etching occurs for from greater than 1 to 15 min.

12. The method of claim 1 wherein the second etching produces bubbling, reaching a maximum rate, and the second etching proceeds until the bubbling rate decreases to less than about 10% of the maximum rate.

13. The method of claim 12 wherein the second etching proceeds until the bubbling stops.

14. The method of claim 1 wherein the abrading comprises bead blasting with 16 to 36 grit alumina.

15. The method of claim 1 wherein the abrading uses process conditions sufficient to produce a R_a roughness of greater than 300 µin before the second etching.

16. A used PVD component refurbishing method comprising:

providing a tantalum PVD component having a TaN layer deposited on a component surface during the PVD use;

first etching the deposited layer for from greater than 1 to 15 min using an etchant that comprises HF;

after the first etching, entraining abrasive particles in a flow of gas, impinging the particles on the etched layer, and abrading the etched layer using process conditions sufficient to produce a R_a roughness of greater than 300 μin; and

after the abrading, second etching the abraded layer with the etchant and producing bubbling that reaches a maximum rate, the second etching proceeding until the bubbling rate decreases to less than about 10% of the maximum rate.

17. The method of claim 16 wherein the first etching, the abrading, and the second etching remove the deposited layer at a rate greater than the same first etching and the same second etching performed without the abrading.

18. The method of claim 16 wherein the first etching, the abrading, and the second etching remove less of the PVD component surface than occurs in removing an equivalent thickness of the deposited layer by extending the abrading and performing the same second etching without the first etching.

19. The method of claim 16 wherein the component comprises a coil.

20. The method of claim 19 wherein the coil was used as a RF coil in a DC magnetron vacuum PVD reactor performing plasma sputtering.

21. The method of claim 19 wherein the coil comprises mounting bosses with interior surfaces and the method further comprises protecting the interior surfaces during the first etching and the abrading, but not during the second etching.

22. The method of claim 16 wherein, aside from processing impurities, the etchant consists of a mixture of equal volumetric parts deionized water, HF, and HNO_3.

23. The method of claim 16 wherein the second etching proceeds until the bubbling stops.

24. The method of claim 16 wherein the abrading comprises bead blasting with 16 to 36 grit alumina.

25. A used PVD coil refurbishing method comprising:

providing a tantalum PVD coil used as a RF coil in a DC magnetron vacuum PVD reactor performing plasma sputtering, the coil having a TaN layer accumulated from PVD on a coil surface;

first etching the deposited layer for from greater than 1 to 15 min using an etchant that, aside from processing impurities, consists of a mixture of equal volumetric parts deionized water, HF, and HNO_3;

after the first etching, entraining a 1:1 mix of 16 and 24 grit alumina in a flow of air, impinging the alumina on the etched layer, and abrading the etched layer using process conditions sufficient to produce a R_a roughness of greater than 300 μin;

after the abrading, second etching the abraded layer with the etchant and producing bubbling that reaches a maximum rate, the second etching proceeding until the bubbling rate decreases to less than about 1% of the maximum rate;

the first etching, the abrading, and the second etching removing the deposited layer at a rate greater than the same first etching and the same second etching performed without the abrading; and

the first etching, the abrading, and the second etching removing less of the PVD component surface than occurs in removing an equivalent thickness of the deposited layer by extending the abrading and performing the same second etching without the first etching.

26. The method of claim 25 wherein the coil comprises mounting bosses with interior surfaces and the method further comprises protecting the interior surfaces during the first etching and the abrading, but not during the second etching.

27. The method of claim 25 wherein the second etching proceeds until the bubbling stops.